DOCUMENT RESUME

ED 365 889 CE 065 700

AUTHOR Beaudin, Bart; And Others
TITLE Anhydrous Ammonia Training Module. Trainer's Package. Participant's Package.
INSTITUTION Colorado State Univ., Ft. Collins. School of Occupational and Educational Studies.
SPONS AGENCY National Inst. for Occupational Safety and Health (DHHS/PHS), Cincinnati, OH.
REPORT NO ETT-94-01; ETT-94-02
PUB DATE 1 Feb 94
NOTE 63p.; Produced by the High Plains Intermountain Center for Agricultural Health and Safety.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052) -- Guides - Classroom Use - Instructional Materials (For Learner) (051)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Agricultural Supplies; *Course Content; *Farm Occupations; Learning Modules; *Occupational Safety and Health; Off Farm Agricultural Occupations; Postsecondary Education; *Safety Education; *Teaching Methods; Units of Study
IDENTIFIERS *Anhydrous Ammonia

ABSTRACT

This document contains a trainer's and a participant's package for teaching employees on site safe handling procedures for working with anhydrous ammonia, especially on farms. The trainer's package includes the following: a description of the module; a competency; objectives; suggested instructional aids; a training outline (or lesson plan) for the module that coordinates time, facilitator actions or statements, and intended results for the entire content of the module; a transparency master of the objectives; and appendixes that provide a sample of safety check lists, a session evaluation form, and session evaluation answers. Contents of the participant's package are as follows: an introduction that outlines the objectives and explains what will be included in the session, information sheets for the three parts of the module (anhydrous ammonia safety standards, step-by-step transfer of anhydrous ammonia, and safety procedures), and an appendix that provides samples of safety check lists. (KC)

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ED 365 889

Anhydrous Ammonia Training Module

Trainer's Package
Participant's Package

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High Plains Intermountain Center for Agricultural Health and Safety
Education & Training Team
Bart P. Beaudin, Ph.D., Team Leader
Report No. ETT-94-01

HI CAHS

Anhydrous Ammonia Training Module

Trainer's Package

Bart Beaudin, Team Leader
School of Occupational and Educational Studies
Colorado State University

Bob Grundemann, Industrial Hygienist
Occupational Health & Safety
Colorado State University

Don Quick, Graduate Research Assistant
School of Occupational and Educational Studies
Colorado State University

February 1, 1994

This research has been made possible through a grant from the
U.S. Department of Health and Human Services
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

NH_3
Anhydrous Ammonia

Anhydrous Ammonia

Training Module

Trainer's Package

HI CAHS
High Plains Intermountain Center for Agricultural Health and Safety
Colorado State University, Fort Collins, Colorado

Anhydrous Ammonia Training Module: Trainer's Package

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Comments and questions should be addressed to:
Bart P. Beaudin, Ph.D.
HI-CAHS Education & Training Team Leader
School of Occupational and Educational Studies
Room 26, Education Building
Colorado State University
Fort Collins, Colorado 80523

This research has been made possible through a grant from the
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Table of Contents

Session Design, Organization & Setup . . . . . [1]
Instructional Intent . . . . . [1]
Audience Description . . . . . [1]
Competency . . . . . [1]
Objectives . . . . . [1]
Instructional Aids . . . . . [1]

Initial Climate Setting and Introduction . . . . . [2]
Competency Transparency . . . . . [4]

Presentation → Application → Reflection . . . . . [5]
Part One - Anhydrous Ammonia Safety Standards . . . . . [5]
Segment 1 - Prologue . . . . . [5]
Segment 2 - The Product: Its Properties and Characteristics . . . . . [5]
Segment 3 - Equipment: Design, Materials, and Standards . . . . . [6]
Segment 4 - Personal Safety Equipment and Requirements . . . . . [7]
Apply and Reflect . . . . . [9]
Break Transparency . . . . . [11]
Part Two - Step By Step Transfer . . . . . [12]
Segment 5 - Anhydrous Ammonia Transfer Systems . . . . . [12]
Segment 6 - Transfer: Transport Truck to Bulk Tank . . . . . [13]
Segment 7 - Transfer: Tank Car to Bulk Plant Tank . . . . . [14]
Segment 8 - Transfer: Bulk Tank to Nurse Tank . . . . . [15]
Segment 9 - Transfer: Nurse Tank to Tool bar / Tillage Applicator . . . [16]
Segment 10 - Equipment Maintenance and Safety Checklists . . . . . [16]
Apply and Reflect . . . . . [17]
Part Three - Safety Procedures . . . . . [19]
Segment 11 - Emergency Procedures in Case of Contact . . . . . [19]
Apply and Reflect . . . . . [19]

Closure . . . . . [20]
Objective Transparency . . . . . [21]

Appendix A - Sample of Farmland, Safety Check Lists . . . . . [A-1]

Appendix B - Session Evaluation Form . . . . . [B-1]

Appendix C - Session Evaluation Answers . . . . . [C-1]

Session Design, Organization & Setup

Total Time: 3 Hrs. 30 Mins

Instructional Intent (Why is this session needed?)

This module was produced to provide an instructional program that will be delivered by an anhydrous ammonia (NH_3) safety specialist to a group of employees at a bulk NH_3 distributing plant. The intention is to improve the employee's knowledge and usage of safe NH_3 handling procedures.

The specialist should deliver a training session on-site and then leave the module with the agency or supplier to train their new employees. The intended benefit is to have ongoing NH_3 safety training on-site without the need of a specialist.

Audience Description (Age; gender; education level ; prior knowledge; previous experience, etc.)

1) COOP Agencies, small fertilizer suppliers
2) Employees who handle NH_3
3) Not intended to be used with framers and/or agri/businesses
4) Ages 16 to 60
5) Eighth grade or better education
6) No prior knowledge or experience (or very little)

Competency (Specific statements of skill or ability expected of completers of this session.)

At the end of this session the trainees will be able to **safely transfer** NH_3 from a bulk tank to another bulk tank, nurse, or applicator.

Objectives (What are the learners expected to do?)

By the end of this session the trainees will be able to:

1) recall the first rule of safety;
2) list the physical properties and characteristics of NH_3;
3) list the hazards of NH_3;
4) recall the only first aid for NH_3;
5) recall why a tank should only be filled to 85% of capacity;
6) recall the need for using proper NH_3 valves, fittings and hoses;
7) demonstrate the proper use of gloves, goggles, and gas mask;
8) recall the need for properly equipping the nurse tank and applicators;
9) transfer NH_3 from a transport truck, tank car, bulk tank, or nurse tank to a bulk tank, nurse tank, or tool bar or tillage applicator safely;
10) recall the main causes for accidents with NH_3; and
11) recall the emergency procedures for treating an NH_3 burn.

Instructional Aids (Tools, equipment, materials, handouts, transparencies, flip charts, textbooks, etc.)

1) Farmland Industries' *Caution Ammonia, Handle with Care* (1984) video tape;
2) Television with VHS video tape player, positioned so that all learners have adequate viewing angle;
3) A quiet environment to show the video;
4) One participant's package for each learner;
5) An adequate supply of evaluation forms (make copies of the one in Appendix B);
6) Demonstration gloves and goggles;
7) Demonstration respirator and gas masks;
8) Demonstration valves, fittings and hoses;
9) Demonstration household ammonia; and
10) Setup to do an actual transfer using one of the methods described in the video.

Initial Climate Setting and Introduction

(Introductions, tie to the learners lives, benefits, session procedures, objectives, relationship to previous sessions, attention getter, etc.)

Session Timing		Facilitator Actions or Statements	Intended Results
For This Section	Elapsed So Far	(Questions, examples, illustrations, demonstrations, visuals, handouts)	(What you want the learner to know and/or do: technical content, concepts, etc.)
2	0	1) Introduce yourself, the **facilitator**, and give short explanation as to why you are here. Tell a story about yourself as an attention getter. Notes:	To establish a relaxed learning environment.
10	2	2) Have the **learners** introduce themselves in turn: - Name; - What job they do; - Ask them to share an example or story of how they have been injured by NH_3 or if they have seen an injury; **Watch the time**	To establish an interest and comfort with their fellow learners. To tie NH_3 safety to their own lives.

Session Timing		Facilitator Actions or Statements	Intended Results
5	12	3) Explain the **benefits** of why the training is important. - prevent what happened in the stories - prevent injuries - give an example of a current accident and relate to benefits - make overhead of a recent accident alert and make handouts Note: Include some benefits specifically related to the facility. - -	To help the learners transfer what they will learn to their work.
1	17	4) Handout participant's package.	To assist learners as they view the video and also when you stop the tape for demonstration and/or discussion.
3	18	5) Review the **competency** for the session. You might want to do this in terms of some of the objectives. These are also in their package. Note: The next page can be made into a transparency if you have an overhead projector available.	To let the learners know what they will be learning.
1	21	6) Explain that you will be playing the tape for a while, and stopping it to give a demonstration or to ask questions. Note: There are 11 segments, broken down into 3 parts.	To prepare the learner for what procedures you will be using during the session.
	22		

Competency

At the end of this session the trainees will be able to **safely** transfer NH_3 from a bulk tank to another bulk tank, nurse, or applicator.

10

11

Presentation → Application → Reflection (Evaluation)

(Present the content; learners apply the acquired knowledge; reflect on the application and assess the learning; continue presenting, applying and reflecting until all the objectives are met; check for a positive climate.)

Session Timing		Facilitator Actions or Statements	Intended Results
For This Section	Elapsed So Far	(Questions, examples, illustrations, demonstrations, visuals, handouts)	(What you want the learner to know and/or do: technical content, concepts, etc.)
		Part One - Anhydrous Ammonia Safety Standards	
		Segment 1 - Prologue	
2	22	1) Start the tape. (Segment 1 is a short introduction to the tape. Let it run on to segment 2.)	

Session Timing		Facilitator Actions or Statements	Intended Results
		Segment 2 - The Product: Its Properties and Characteristics	
6	24	2) Continue the tape. Observe participants for non-verbal cues as to their understanding. What you observe may guide your questions at the end. It may also require you to stop the tape to explain or to apply what they are seeing.	What the learner needs to know: a) the first rule of safety: - use gloves and goggles b) physical properties of NH_3: - stored under pressure as a liquid - becomes vapor in the atmosphere - looks like water - is a strong irritant - is lighter than air, except in high humidity - is lighter then water, reason for low flow ratings on valves and fittings c) characteristics of NH_3: - boils at -28°F - expands 850 times in the atmosphere - has a strong pungent odor - excludes oxygen and will easily burn lungs d) hazards of NH_3: - freezes anything it comes in contact with - expands rapidly in the atmosphere e) **water** - the only first aid for NH_3.

Session Timing		Facilitator Actions or Statements	Intended Results
		Segment 3 - Equipment: Design, Materials, and Standards	
8	30	3) Continue the tape. Observe participants for non-verbal cues as to their understanding. What you observe may guide your questions at the end. It may also require you to stop the tape to explain or to apply what they are seeing.	What the learner needs to know: a) remember the 85% rule when filling the tank: - never fill a tank more then 85% full - as temperature goes up vapor pressure goes up b) there are standards for valves, fittings and hoses: - excess flow valves - vapor relief valves - pressure relief valves - back check valves - manual shut off valves - hose end valves (not quarter turn valves) - vapor return valves - special NH_3 hoses - pipe and pipe fittings - fixed liquid level bleeder valves - 85% bleeder valves - float gauge

Session Timing		Facilitator Actions or Statements	Intended Results
		Segment 4 - Personal Safety Equipment and Requirements	
5	38	4) Continue the tape. Observe participants for non-verbal cues as to their understanding. What you observe may guide your questions at the end. It may also require you to stop the tape to explain or to apply what they are seeing.	What the learner needs to know: These safety items must be available whenever NH_3 is stored and used. Refer to Farmland's detailed check lists in Appendix A of this package for more information. a) personal protective equipment required at a bulk plant: - water tank or shower & eye wash - full face gas mask and canisters for use with anhydrous ammonia - liquid proof gloves - goggles - rain suit - boots - self-contained breathing apparatus - first aid kit - fire extinguisher - locks - signs and decals - wheel chocks - signs b) nurse tanks and pull type applicators: - water reservoir - goggles and gloves - decals and signs - hoses - safety chain c) tillage equipment: - quick disconnect on flow control
	43		

Session Timing		Facilitator Actions or Statements	Intended Results
		Apply and Reflect	
22	43	5) Stop the tape.	
		6) Circulate samples of some of the valves, fittings and hoses.	To allow for application by demonstrating of the safety equipment.
		7) Circulate the bottle of household ammonia, so they will know what it smells like.	
		8) Refer to the checklists in the participant's package.	
		9) Demonstrate the usage of the gloves and goggles.	
		10) Demonstrate respirator and gas masks. Ask for volunteers from the learners.	
		11) Discuss cleaning the water tanks and checking the water reservoirs.	
		12) Discuss checking the equipment. *Note: Check farmers equipment. This is especially important to be done in the Spring before the first application is applied.*	
5	1 - 05	7) Ask for questions.	To give the learners time to reflect on what they have seen.

Session Timing		Facilitator Actions or Statements	Intended Results
5	1 - 10	8) Ask questions: *Note: Skip if time is short.* QQ: **Why is water the only first aid?** Ammonia is attracted to water when released into the atmosphere. QQ: **Why can't you use normal valves and fitting?** Lighter than water. Will not flow as rapidly. QQ: **Why can't you fill the tank more then 85% full?** Volume and weight changes with temperature change. QQ: **Why is a water tank or shower a requirement?** Water is the only thing that will wash NH_3 off.	To reinforce the main points and to see if learning has occurred.
15	1 - 15	9) End of the first part. ***** Take a 15 Minute Break *****	
	1 - 30		

Take a 15 Minute Break

20

21

Presentation → Application → Reflection (Evaluation)

(Present the content; learners apply the acquired knowledge; reflect on the application and assess the learning; continue presenting, applying and reflecting until all the objectives are met; check for a positive climate.)

Session Timing		Facilitator Actions or Statements	Intended Results
For This Section	Elapsed So Far	(Questions, examples, illustrations, demonstrations, visuals, handouts)	(What you want the learner to know and/or do: technical content, concepts, etc.)
	1 - 30	**Part Two - Step By Step Transfer** *Note: The total time to play this part is 26 minutes in 5 segments. Play all the segments even though the agency or supplier may not have the equipment depicted. The tape goes through each transfer too quickly, however, the repitition is helpful for a transfer of learning to take place, and the reinforcement at the end will help clarify points on the agency's specific equipment.*	
		Segment 5 - Anhydrous Ammonia Transfer Systems	
3	1 - 30	1) Start the video. Observe participants for non-verbal cues as to their understanding. What you observe may guide your questions at the end. It may also require you to stop the tape to explain or to apply what they are seeing.	What the learner needs to know: a) there are three NH_3 transfer systems: - Bleed-Off least expensive some product loss slow - Vapor Compressor flexible faster little product loss most expensive longer life than the pump more practical - Liquid Pump fast little product loss less expensive easy to handle b) differences are mostly economic and personal preference.

Session Timing		Facilitator Actions or Statements	Intended Results
		Segment 6 - Transfer: Transport Truck to Bulk Tank *Note: This segment also shows the procedure for using the Liquid Pump transfer system.*	
4	1 - 33	2) Continue the tape. Observe participants for non-verbal cues as to their understanding. What you observe may guide your questions at the end. It may also require you to stop the tape to explain or to apply what they are seeing.	What the learner needs to know: a) make sure safety items are available and used: - goggles and gloves - gas mask - water: - on the truck - tank or shower - NO contact lenses b) make sure the bulk tank can hold all of the NH_3 that is in the truck tank; c) check all valves and hoses for defects; d) open all valves in proper order and **SLOWLY**; e) check for 5-6 inches of liquid in the tank before full transfer rate is attained to prevent damage to the float; **f) make sure someone is always with the process during transfer;** g) fill to 85%, use the bleeder not the gauge; h) follow the disconnect procedure, carefully; i) vent the bleeders, carefully ; j) double check all procedures before pulling truck away.

Session Timing		Facilitator Actions or Statements	Intended Results
		Segment 7 - Transfer: Tank Car to Bulk Plant Tank *Note: This segment also shows the procedure for using the Vapor Compressor transfer system.*	
7	1 - 37	3) Continue the tape. Observe participants for non-verbal cues as to their understanding. What you observe may guide your questions at the end. It may also require you to stop the tape to explain or to apply what they are seeing.	What the learners need to know: a) make sure safety items are available and used: - goggles and gloves - gas mask - water: - on the truck - tank or shower - NO contact lenses b) make sure the bulk tank can hold all of the NH_3 that is in the tank car; c) check all valves and hoses for defects; d) close all valves; e) do not allow any part of your body to be over the relief valve; f) remove plugs and attach hoses, **SLOWLY**; g) open all valves in proper order, **SLOWLY**; h) make sure the compressor is operating properly; i) check for 5-6 inches of liquid in the tank before full transfer rate is attained to prevent damage to float; **j) make sure someone is always with the process during transfer;** k) fill to 85%, use the bleeder not the gauge; l) make sure tank car is empty; m) follow the disconnect procedure carefully; n) vent the bleeders carefully; o) double check all procedures before turning the car back to the railroad.

Session Timing		Facilitator Actions or Statements	Intended Results
		Segment 8 - Transfer: Bulk Tank to Nurse Tank *Note: This segment also shows the procedure for using the Liquid Pump transfer system.* *It also gives some special general safety tips.*	
6	1 - 44	4) Continue the tape. Observe participants for non-verbal cues as to their understanding. What you observe may guide your questions at the end. It may also require you to stop the tape to explain or to apply what they are seeing.	What the learners need to know: a) make sure safety items are available and used: - goggles and gloves - gas mask - water: - on the truck - tank or shower - NO contact lenses b) check all valves and hoses for defects; c) open all valves in proper order, **SLOWLY;** **d) make sure someone is always with the process during transfer;** e) fill to 85%, use the bleeder not the gauge; f) follow the disconnect procedure, carefully; g) vent the bleeders, carefully; h) double check all procedures before pulling nurse tank away; i) drive maximum speed of 25 mph; j) Special Tips: - never use a wrench when making Acme connections or when closing valves, hand tighten only; - never drop, toss or throw hose-end valves; - never use the hand lever or wheel on hose-end valves as a lever; - never unload more then one tank at a time.

Session Timing		Facilitator Actions or Statements	Intended Results
		Segment 9 - Transfer: Nurse Tank to Tool bar / Tillage Applicator *Note: This segment also shows the procedure for using the Bleed-off transfer system.*	
6	1 - 50	5) Continue the tape. Observe participants for non-verbal cues as to their understanding. What you observe may guide your questions at the end. It may also require you to stop the tape to explain or to apply what they are seeing.	What the learners need to know: a) make sure safety items are available and used: - goggles and gloves - ammonia respirator - water - on the nurse tank b) check all valves and hoses for defects; c) open all valves in proper order and **SLOWLY** checking for leaks; **d) make sure someone is always with the process during transfer;** e) fill to 85%, use the bleeder not the gauge; f) follow the disconnect procedure, carefully; g) vent the bleeders, carefully ; h) double check all procedures before pulling truck away.
		Segment 10 - Equipment Maintenance and Safety Checklists	
2	1 - 56	6) Continue the tape. Observe participants for non-verbal cues as to their understanding. What you observe may guide your questions at the end. It may also require you to stop the tape to explain or to apply what they are seeing.	What the learners need to know: a) samples of the safety check lists are included in the participant's package and in Appendix A of this document. b) Please, feel free to duplicate any of these forms as needed.

Session Timing		Facilitator Actions or Statements	Intended Results
		Apply and Reflect	
7	1 - 58	7) **Stop the tape.** 8) Refer to the check lists in the participant's package. 9) Review the main points of the transfer most used at this facility. - - - - -	To allow for application, reinforcement and relevancy through review of the transfer system they may be familiar with.
5	2 - 5	10) Ask for questions.	To give the learners time to reflect on what they have seen.

Session Timing		Facilitator Actions or Statements	Intended Results
5	2 - 10	11) Ask questions: *Note: Skip if time is short.* QQ: **Why must the truck or tank car be empty?** So the bulk plant is charged for the right amount. So that a tank is marked empty is indeed empty when being transported back to the plant. QQ: **Why open valves slowly?** May cause excess flow valve to close and it may be hard to re-open. QQ: **Why drive nurse tank less then 25 mph?** - no breaks on the nurse tank - tires designed for field use - ammonia is dangerous - some States require it	To reinforce the main points and to check for understanding.
	2 - 15		

Presentation → Application → Reflection (Evaluation)

(Present the content; apply the acquired knowledge; reflect on the application and assess the learning; continue presenting, applying and reflecting until all the objectives are met; check for a positive climate.)

Session Timing		Facilitator Actions or Statements	Intended Results
For This Section	Elapsed So Far	(Questions, examples, illustrations, demonstrations, visuals, handouts)	(What you want the learner to know and/or do: technical content, concepts, etc.)
		Part Three - Safety Procedures	
		Segment 11 - Emergency Procedures in Case of Contact	
6	2 - 15	1) Start the tape. Observe participants for non-verbal cues as to their understanding. What you observe may guide your questions at the end. It may also require you to stop the tape to explain or to apply what they are seeing.	What the learners need to know: a) common causes of accidents: - not bleeding the bleeder valves - improper handling of hose-end valve - allowing hoses to develop bubbles - during cleaning of injection tubes - hitchpin failing b) Water is the only first aid: - 15 minute flushing - do not shed clothing - go to the doctor or hospital - never wear contact lenses - no salves, ointment or grease
		Apply and Reflect	
4	2 - 21	2) **Stop the tape**	
		3) Ask for questions.	To give the learners time to reflect on what they have seen.
45	2 - 25	4) Adjourn to where you can help with an actual transfer. Allow the learner to apply their knowledge, do not just demonstrate. *Note: If it is not practical to come back for Closure, then wait until the end.*	To allow for application of the recently acquired knowledge.
	3 - 10		

Closure

(Reinforce what has been learned, prepare the learners for the next session's assignments, and complete the session evaluation)

Session Timing		Facilitator Actions or Statements	Key Points
For this Section	Elapsed So Far	(Questions, examples, illustrations, demonstrations, visuals, handouts)	(What you want the learner to know and/or do: technical content, concepts, etc.)
10	3 - 10	1) Review the objectives. *Note: A transparency can be made of the following page to help facilitate this review.*	Re-enforces the main points that you want them to transfer to their work environment.
10	3 - 20	2) Have the learners complete the session evaluation (more can be made from the copy in Appendix B of this module). Review the answers to the questions after they have filled out the form. *Note: Appendix C has the answers to the questions.*	To find out if learning has been transferred and to indicate where improvements can be made.
	3 - 30	*Note: If it was not practical to come back for Closure, then adjourn to where you can help with an actual transfer.* *Allow the learner to apply their knowledge, do not just demonstrate..*	

***** Caution Ammonia Handle with Care *****

Objectives

By the end of this session the trainees will be able to:

1) recall the first rule of safety;
2) list the physical properties and characteristics of NH_3;
3) list the hazards of NH_3;
4) recall the only first aid for NH_3;
5) recall why a tank should only be filled to 85% of capacity;
6) recall the need for using proper NH_3 valves, fittings and hoses;
7) demonstrate the proper use of gloves, goggles, and gas mask;
8) recall the need for properly equipping the nurse tank and applicators;
9) transfer NH_3 from a transport truck, tank car, bulk tank, or nurse tank to a bulk tank, nurse tank, or tool bar or tillage applicator, safely;
10) recall the main causes for accidents with NH_3; and
11) recall the emergency procedures for treating an NH_3 burn.

Appendix A - Sample of Farmland. Safety Check Lists

AMMONIA BULK PLANT SAFETY CHECK LIST

	SATIS-FACTORY	UNSATIS-FACTORY
1. Are all employees properly trained?	_____	_____
2. Does every farmer receive instructions before being allowed to use the co-op's nurse tanks or applicators?	_____	_____
3. Are goggles or face shields used by all persons handling ammonia?	_____	_____
4. Are liquid-proof gloves used by all persons handling ammonia?	_____	_____
5. Is a safety water tank or an approved deluge shower available?	_____	_____
6. Is a rain suit or slicker available?	_____	_____
7. Are boots available?	_____	_____
8. Are two full-face gas masks for anhydrous ammonia available?	_____	_____
9. Are extra canisters current?	_____	_____
10. Is an approved first aid kit at the site?	_____	_____
11. Are wheel chocks for nurse tanks and rail cars available?	_____	_____
12. Is the fire extinguisher in good condition?	_____	_____
13. Has the local emergency crew been trained in handling ammonia emergencies?	_____	_____
14. Are there two self-contained air masks available for emergencies?	_____	_____
15. Are safety belts and life lines available?	_____	_____
16. Are the tanks approved for ammonia?	_____	_____
17. Is all piping done with Schedule 80, black pipe (no galvanized, copper, bronze or brass)?	_____	_____
18. Are all valves, etc., approved for ammonia?	_____	_____
19. Are all hoses labeled for ammonia?	_____	_____
20. Are hoses inspected regularly and changed when age or condition require?	_____	_____
21. Are excess flow checks in all openings where required?	_____	_____
22. Are all hoses and pipes equipped with relief valves where needed?	_____	_____
23. Are all relief valves capped?	_____	_____
24. Are relief valves replaced regularly?	_____	_____
25. Is the site clean and well kept?	_____	_____

AMMONIA PLANT SAFETY CHECK LIST (cont.)	SATIS-FACTORY	UNSATIS-FACTORY
26. Is there an automatic back check in the transport liquid line?	_____	_____
27. Is the co-op name, etc., on the plant?	_____	_____
28. Are the "Caution — Ammonia" or "Anhydrous Ammonia" decals in place?	_____	_____
29. Are the "Warning" & "First Aid" decals in place?	_____	_____
30. Are "Wear Your Goggles" decals located throughout the work area?	_____	_____
31. Is a "First Aid Water" decal on the safety tank or shower?	_____	_____
32. Are the liquid and vapor valves properly identified?	_____	_____
33. Is the transport stub marked "Caution — Ammonia" or "Anhydrous Ammonia?"	_____	_____
34. Is the manager's name and home phone number on the tank in 1-inch or larger letters?	_____	_____
35. Is the plant locked when unattended?	_____	_____
36. Is the paint on the tank in good condition?	_____	_____
37. Are all personnel assigned to ammonia physically capable to work in a hazardous area?	_____	_____
38. Are "Stop — Tank Car Connected" signs available and used?	_____	_____
39. Are protective guards in place and in good condition?	_____	_____
40. Is the facility free of leaks and in good condition?	_____	_____
41. Are tank supports in good condition? (No cracked or crumbled concrete, etc.)?	_____	_____
42. Are gauges — pressure and liquid level — operative?	_____	_____
43. Are hoses suitably racked and locked to prevent tampering?	_____	_____

_____ _____

Name of Co-op Location and Plant

_____ _____

Inspected by Date

All items reinspected and found satisfactory.

_____ _____

Reinspected by Date

It is your responsibility to be in compliance with your state regulations.

97-7023/590/1/12777

NURSE TANK ID # _____

AMMONIA NURSE TANK SAFETY CHECK LIST

	SATIS-FACTORY	UNSATIS-FACTORY
1. Is the safety water container on and full?	_____	_____
2. Is the safety chain and hitch pin in good condition?	_____	_____
3. What is the condition of the wagon tongue?	_____	_____
4. Are proper decals (in accordance with state requirements) on the nurse tank?	_____	_____
"Anhydrous Ammonia"	_____	_____
"Caution Ammonia" — Compound Curve	_____	_____
"Caution Ammonia" — Straight Line	_____	_____
"Wear Your Goggles"	_____	_____
"First Aid Water"	_____	_____
"Guaranteed Analysis"	_____	_____
"Slow Moving Vehicle"	_____	_____
"Vapor and Liquid Valve Markings"	_____	_____
"Warning and First Aid Decal Set"	_____	_____
"Maximum Pulling Speed"	_____	_____
"Ownership Identification"	_____	_____
"Tank Identification Numerals"	_____	_____
"1005" Placards	_____	_____
5. Are there glove and goggle pouches?	_____	_____
6. Are gloves and goggles in good condition?	_____	_____
7. Have wheel bearings been checked and greased?	_____	_____
8. Are tires in good condition, properly inflated and wheels in proper alignment?	_____	_____
9. Are tongue pins (tongue to axle) in good condition?	_____	_____
10. What is the condition of the paint?	_____	_____
11. What is the condition of the hose and hose end valve?	_____	_____
12. Are all hose end valves equipped with a self-locking device?	_____	_____
13. Has rayon hose been replaced within last two years?	_____	_____
Nylon Braid — 4 years	_____	_____
Stainless Steel Braid — 6 years	_____	_____

AMMONIA NURSE TANK SAFETY CHECK LIST (cont.)	SATIS-FACTORY	UNSATIS-FACTORY
14. Is there a current dated pressure relief valve?	_____	_____
15. Is there a cap on the pressure relief valve?	_____	_____
16. Are there a pair of chock blocks available?	_____	_____
17. Are gauges in good working condition?	_____	_____
Pressure?	_____	_____
Float?	_____	_____
85 perecnt bleeder?	_____	_____
18. Are Acme caps on all vapor and liquid valves?	_____	_____
19. Are back check valves working?	_____	_____
20. Are valves marked "liquid" and "vapor?"	_____	_____
21. Is the nurse tank free of dents, cracks, bulges or other impairments?	_____	_____
22. Are the welds in good condition?	_____	_____
23. Is the weep hole on the relief valve open and free of paint or foreign material?	_____	_____
24. Are the nurse tank hoses protected by a hydrostatic relief valve?	_____	_____
25. Are the liquid and vapor valves in good working condition?	_____	_____
26. Is the frame in generally good condition and are the tank hold-down devices adequate?	_____	_____

_____ _____

Name of Co-op Location and Plant

_____ _____

Inspected by Date

All items reinspected and found satisfactory.

_____ _____

Reinspected by Date

It is your responsibility to be in compliance with your state regulations.

97-7025/590/1/12777

Applicator ID # _____

AMMONIA APPLICATOR SAFETY CHECK LIST

	SATIS-FACTORY	UNSATIS-FACTORY
1. Are all farmers instructed before they are allowed to use a co-op's applicator?	_____	_____
2. Is there a cartridge respirator for ammonia in the cab of every tractor while it is pulling any ammonia equipment?	_____	_____
3. Is the pressure bled out of the metering device before starting to clean the screen?	_____	_____
4. Is the pressure between the hose end valve and the applicator valve (or breakaway) bled off before disconnecting the hose end valve?	_____	_____
5. Is an angle hose end valve used on nurse tanks to fill pull-type applicators?	_____	_____
6. Have all connections and valves been checked for leaks?	_____	_____
PULL-TYPE APPLICATOR		
1. Is there a full safety water container attached?	_____	_____
2. Is the safety chain and hitch pin in good condition?	_____	_____
3. Are proper decals (in accordance with state requirements) on the nurse tank?	_____	_____
"Anhydrous Ammonia"	_____	_____
"Caution Ammonia" — Compound Curve	_____	_____
"Caution Ammonia" — Straight Line	_____	_____
"Wear Your Goggles"	_____	_____
"First Aid Water"	_____	_____
"Guaranteed Analysis"	_____	_____
"Slow Moving Vehicle"	_____	_____
"Vapor and Liquid Markings"	_____	_____
"Warning and First Aid Decal Set"	_____	_____
"Ownership Identification"	_____	_____
"Tank Identification Numerals"	_____	_____
"1005" Placards	_____	_____
4. Have wheel bearings been checked and greased?	_____	_____
5. Are tires and wheels in good condition and properly inflated?	_____	_____
6. What is the condition of the paint?	_____	_____
7. What is the condition of applicator tubes?	_____	_____
8. Is there a current dated pressure relief valve?	_____	_____
9. Is there a cap on the pressure relief valve?	_____	_____
10. Are gauges in good working condition?	_____	_____
Pressure?	_____	_____
Float?	_____	_____
85 percent bleeder?	_____	_____

AMMONIA APPLICATOR SAFETY CHECK LIST (cont.)	SATIS-FACTORY	UNSATIS-FACTORY
11. Are Acme caps on all vapor and liquid valves?	_____	_____
12. Are back check valves working?	_____	_____
13. Is the applicator tank free of dents, cracks, or bulges or other impairments?	_____	_____
14. Are welds in good condition?	_____	_____
15. Is the weep hole on the relief valve open and free of paint or foreign material?	_____	_____
16. Are the liquid and vapor valves in good working order?	_____	_____
17. Is the frame in good condition and are the tank hold-down devices adequate?	_____	_____
18. Is there a gloves and goggle pouch?	_____	_____
19. Are gloves and goggles in good condition on applicator?	_____	_____
20. If applicator has fold-up wings, are pins in good condition that secure wings in upright position?	_____	_____
TOOL BAR-TYPE APPLICATOR		
1. Is a quick disconnect (breakaway coupler) between the applicator and hose end valve?	_____	_____
2. Is the quick disconnect mounted solidly?	_____	_____
3. Does the quick disconnect make and break easily?	_____	_____
4. Does it leak?	_____	_____
5. Is the nurse tank safety chain connected to the applicator?	_____	_____
6. Is the hitch pin in good condition?	_____	_____
7. Does nurse tank hose end have globe line valve (straight through type)?	_____	_____
8. What is the condition of the applicator tubes?	_____	_____
9. If applicator has fold-up wings, are pins in good condition that secure wings in upright position?	_____	_____
10. What is the condition of pins and structural strength of 3-point hitch on tool bar?	_____	_____

_____ _____

Name of Co-op Location and Plant

_____ _____

Inspected by Date

All items reinspected and found satisfactory.

_____ _____

Reinspected by Date

It is your responsibility to be in compliance with your state regulations.

97-7017/590/1/12777

Appendix B - Session Evaluation Form

Session Evaluation

Unlike a test, the aim of this section of the evaluation form is not to assess the person who has completed the form. Rather, the goal is to provide the presenters with information on their ability to transmit knowledge to the audience. Please **circle** the answer for each question below that you consider to be **most accurate.**

1) What is the best first aid for an anhydrous ammonia burn?
   - A) Water
   - B) Grease
   - C) Alcohol
   - D) Any Salve

2) What is the "first rule of safety" when working with NH_3?
   - A) Always wear a respirator.
   - B) Always stand in a tank of water.
   - C) Always wear approved gloves and goggles.
   - D) Always take a break while the tank is filling.

3) What is the maximum limit that you should fill a tank?
   - A) 50%
   - B) 65%
   - C) 75%
   - D) 85%

4) When starting the transfer of NH_3, how must valves be opened?
   - A) Fast
   - B) Slowly
   - C) Halfway
   - D) It doesn't matter

5) What is the maximum speed for driving a truck with an NH_3 nurse tank attached?
   - A) 15 mph
   - B) 25 mph
   - C) 35 mph
   - D) 45 mph

Please rate the following:

	Poor				Excellent
6) Was the purpose of this session clear?	1	2	3	4	5
Comments: _____					
7) Was the information presented clearly?	1	2	3	4	5
Comments: _____					
8) Was the session useful?	1	2	3	4	5
Comments: _____					
9) How would you rate the facilitator?	1	2	3	4	5
Comments: _____					
10) How would you rate the video?	1	2	3	4	5
Comments: _____					

Appendix C - Session Evaluation Answers

1) What is the best first aid for an anhydrous ammonia burn?
   * **A) Water**
   B) Grease
   C) Alcohol
   D) Any Salve

2) What is the "first rule of safety" when working with NH_3?
   A) Always wear a respirator.
   B) Always stand in a tank of water.
   * **C) Always wear approved gloves and goggles.**
   D) Always take a break while the tank is filling.

3) What is the maximum limit that you should fill a tank?
   A) 50%
   B) 65%
   C) 75%
   * **D) 85%**

4) When starting the transfer of NH_3, how must valves be opened?
   A) Fast
   * **B) Slowly**
   C) Halfway
   D) It doesn't matter

5) What is the maximum speed for driving a truck with an NH_3 nurse tank attached?
   A) 15 mph
   * **B) 25 mph**
   C) 35 mph
   D) 45 mph

Colorado State University
Fort Collins, CO

High Plains Intermountain Center for Agricultural Health and Safety
Education & Training Team
Bart P. Beaudin, Ph.D., Team Leader
Report No. ETT-94-02

HI CAHS

Anhydrous Ammonia Training Module

Participant's Package

Bart Beaudin, Team Leader
School of Occupational and Educational Studies
Colorado State University

Bob Grundemann, Industrial Hygienist
Occupational Health & Safety
Colorado State University

Don Quick, Graduate Research Assistant
School of Occupational and Educational Studies
Colorado State University

February 1, 1994

This research has been made possible through a grant from the
U.S. Department of Health and Human Services
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

NH_3
Anhydrous Ammonia

Anhydrous Ammonia

Training Module

Participant's Package

HI CAHS
High Plains Intermountain Center for Agricultural Health and Safety
Colorado State University, Fort Collins, Colorado

Anhydrous Ammonia Training Module: Participant's Package

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Comments and questions should be addressed to:
Bart P. Beaudin, Ph.D.
HI-CAHS Education & Training Team Leader
School of Occupational and Educational Studies
Room 26, Education Building
Colorado State University
Fort Collins, Colorado 80523

This research has been made possible through a grant from the
U.S. Department of Health and Human Services
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Table of Contents

Introduction . . . . . [1]

Part One - Anhydrous Ammonia Safety Standards . . . . . [2]
The Product: Its Properties and Characteristics . . . . . [2]
Equipment: Design, Materials, and Standards . . . . . [3]
Personal Safety Equipment and Requirements . . . . . [4]

Part Two - Step By Step Transfer . . . . . [5]
Anhydrous Ammonia Transfer Systems . . . . . [5]
Transfer: Transport Truck to Bulk Tank . . . . . [6]
Transfer: Tank Car to Bulk Plant Tank . . . . . [7]
Transfer: Bulk Tank to Nurse Tank . . . . . [8]
Special Tips . . . . . [8]
Transfer: Nurse Tank to Tool bar or Tillage Applicator . . . . . [9]
Equipment Maintenance and Safety Checklists . . . . . [9]

Part Three - Safety Procedures . . . . . [10]
Emergency Procedures in Case of Contact . . . . . [10]

Closure . . . . . [11]

Appendix A - Samples of Farmland. Safety Check Lists . . . . . [A-1]

Introduction

Time to complete this module: 3 Hours 30 Minutes

Welcome to the High Plains Intermountain Agricultural Health and Safety (HI-CAHS) Anhydrous Ammonia Training Session. During this session, you will be exposed to safety information that will help you prevent accidents from happening when working with anhydrous ammonia (NH_3).

> The sharp, pungent odor of ammonia is its own warning agent. There is no reason to fear ammonia if proper equipment is used and safe operating procedures are followed. Practically all accidents involving anhydrous ammonia are the result of lack of knowledge, misunderstanding, carelessness, or poorly maintained or unsuitable equipment. (*Working Safely with Anhydrous Ammonia*, NIOSH, No. 79-120, 1979)

Our goal is that by the end of this session you will be able to **safely transfer** NH_3 from a bulk tank to another bulk tank, nurse, or applicator.

Further objectives of this session are that will be able to:

1) recall the first rule of safety;
2) list the physical properties and characteristics of NH_3;
3) list the hazards of NH_3;
4) recall the only first aid for NH_3;
5) recall why a tank should only be filled to 85% of capacity;
6) recall the need for using proper NH_3 valves, fittings and hoses;
7) demonstrate the proper use of gloves, goggles, and gas mask;
8) recall the need for properly equipping the nurse tank and applicators;
9) transfer NH_3 from a transport truck, tank car, bulk tank, or nurse tank to a bulk tank, nurse tank, or tool bar or tillage applicator, safely;
10) recall the main causes for accidents with NH_3; and
11) recall the emergency procedures for treating an NH_3 burn.

You will be viewing a video tape, discussing the tape with the session facilitator, applying what you learn by working with the safety equipment and transferring NH_3 in a safe manner.

Part One - Anhydrous Ammonia Safety Standards

The Product: Its Properties and Characteristics

Some important points:

a) the first rule of safety:
- use gloves and goggles

b) physical properties of NH_3:
- stored under pressure as a liquid
- becomes vapor in the atmosphere
- looks like water
- is a strong irritant
- is lighter than air, except in high humidity
- is lighter then water, reason for low flow ratings on valves and fittings

c) characteristics of NH_3:
- boils at -28°F
- expands 850 times in the atmosphere
- has a strong pungent odor
- excludes oxygen and will easily burn lungs

d) hazards of NH_3:
- freezes anything it comes in contact with
- expands rapidly in the atmosphere.

e) **water** - the only first aid for NH_3.

Equipment: Design, Materials, and Standards

Some important points:

a) remember the **85% rule** when filling the tank:
- never fill a tank more then 85% full
- as temperature goes up vapor pressure goes up

b) there are standards for valves, fittings and hoses:
- excess flow valves
- vapor relief valves
- pressure relief valves
- back check valves
- manual shut off valves
- hose end valves
  (not quarter turn valves)
- vapor return valves
- special NH_3 hoses
- pipe and pipe fittings
- fixed liquid level bleeder valves
- 85% bleeder valves
- float gauge

Personal Safety Equipment and Requirements

These safety items must be available whenever NH_3 is stored and used. (Refer to the samples of Farmland's detailed check lists in Appendix A of this package for more information.)

Some important points:

a) personal protective equipment required at a bulk plant:
- water tank or shower & eye wash
- full face gas mask and canisters for use with anhydrous ammonia
- liquid proof gloves
- goggles
- rain suit
- boots
- self-contained breathing apparatus
- first aid kit
- fire extinguisher
- locks
- signs and decals
- wheel chocks
- signs

b) nurse tanks and pull type applicators:
- water reservoir
- goggles and gloves
- decals and signs
- hoses
- safety chain

c) tillage equipment:
- quick disconnect on flow control

Part Two - Step By Step Transfer

Anhydrous Ammonia Transfer Systems

Some important points:

a) there are three main NH_3 transfer systems:

- Bleed-Off
  - least expensive
  - some product loss
  - slow

- Vapor Compressor
  - flexible
  - faster
  - little product loss
  - most expensive
  - longer life than the pump
  - more practical

- Liquid Pump
  - fast
  - little product loss
  - less expensive
  - easy to handle

b) Differences in systems are mostly economic and personal preference.

Transfer: Transport Truck to Bulk Tank

Some important points:

a) make sure safety items are available and used:
- goggles and gloves
- gas mask
- water: - on the truck
- tank or shower
- NO contact lenses

b) make sure the bulk tank can hold all of the NH_3 that is in the truck tank;

c) check all valves and hoses for defects;

d) open all valves in proper order and **SLOWLY**;

e) check for 5-6 inches of liquid in the tank before full transfer rate is attained to prevent damage to the float;

f) make sure someone is always with the process during transfer;

g) fill to 85%, use the bleeder not the gauge;

h) follow the disconnect procedure, carefully ;

i) vent the bleeders, carefully ;

j) double check all procedures before pulling truck away.

Transfer: Tank Car to Bulk Plant Tank

Some important points:

a) make sure safety items are available and used:
- goggles and gloves
- gas mask
- water: - on the truck
- tank or shower
- NO contact lenses

b) make sure the bulk tank can hold all of the NH_3 that is in the tank car;

c) check all valves and hoses for defects;

d) close all valves;

e) do not allow any part of your body to be over the relief valve;

f) remove plugs and attach hoses, **SLOWLY**;

g) open all valves in proper order, **SLOWLY;**

h) make sure the compressor is operating properly;

i) check for 5-6 inches of liquid in the tank before full transfer rate is attained to prevent damage to float;

j) make sure someone is always with the process during transfer;

k) fill to 85%, use the bleeder not the gauge;

l) make sure tank car is empty;

m) follow the disconnect procedure carefully;

n) vent the bleeders carefully;

o) double check all procedures before turning the car back to the railroad.

Transfer: Bulk Tank to Nurse Tank

Some important points:

a) make sure safety items are available and used:
- goggles and gloves
- gas mask
- water: - on the truck
  - tank or shower
- NO contact lenses

b) check all valves and hoses for defects;

c) open all valves in proper order, **SLOWLY;**

d) make sure someone is always with the process during transfer;

e) fill to 85%, use the bleeder not the gauge;

f) follow the disconnect procedure, carefully;

g) vent the bleeders, carefully;

h) double check all procedures before pulling nurse tank away;

i) drive maximum speed of 25 mph;

j) Special Tips:
- never use a wrench when making Acme connections or when closing valves, hand tighten only;
- never drop, toss or through hose-end valves;
- never use the hand lever or wheel on hose-end valves as a lever;
- never unload more then one tank at a time.

Transfer: Nurse Tank to Tool bar or Tillage Applicator

Some important points:

a) make sure safety items are available and used:
   - goggles and gloves
   - ammonia respirator
   - water - on the nurse tank

b) check all valves and hoses for defects;

c) open all valves in proper order and **SLOWLY** checking for leaks;

d) make sure someone is always with the process during transfer;

e) fill to 85%, use the bleeder not the gauge;

f) follow the disconnect procedure, carefully;

g) vent the bleeders, carefully;

h) double check all procedures before pulling truck away.

Equipment Maintenance and Safety Checklists

The safety check lists are included in Appendix A of this document. (Please, feel free to duplicate any of these forms as needed.)

Part Three - Safety Procedures

Emergency Procedures in Case of Contact

Some important points:

a) common causes of accidents:

- not bleeding the bleeder valves
- improper handling of hose-end valve
- allowing hoses to develop bubbles
- during cleaning of injection tubes
- hitchpin failing

b) Water is the only first aid:

- 15 minute flushing
- do not shed clothing
- go to the doctor or hospital
- never wear contact lenses
- no salves, ointment or grease

Closure

Review the objectives:

By the end of this session you will be able to:

1) recall the first rule of safety;

2) list the physical properties and characteristics of NH_3;

3) list the hazards of NH_3;

4) recall the only first aid for NH_3;

5) recall why a tank should only be filled to 85% of capacity;

6) recall the need for using proper NH_3 valves, fittings and hoses;

7) demonstrate the proper use of gloves, goggles, and gas mask;

8) recall the need for properly equipping the nurse tank and applicators;

9) transfer NH_3 from a transport truck, tank car, bulk tank, or nurse tank to a bulk tank, nurse tank, or tool bar or tillage applicator, safely;

10) recall the main causes for accidents with NH_3; and

11) recall the emergency procedures for treating an NH_3 burn.

Appendix A - Samples of Farmland Safety Check Lists

AMMONIA BULK PLANT SAFETY CHECK LIST

	SATIS-FACTORY	UNSATIS-FACTORY
1. Are all employees properly trained?	_____	_____
2. Does every farmer receive instructions before being allowed to use the co-op's nurse tanks or applicators?	_____	_____
3. Are goggles or face shields used by all persons handling ammonia?	_____	_____
4. Are liquid-proof gloves used by all persons handling ammonia?	_____	_____
5. Is a safety water tank or an approved deluge shower available?	_____	_____
6. Is a rain suit or slicker available?	_____	_____
7. Are boots available?	_____	_____
8. Are two full-face gas masks for anhydrous ammonia available?	_____	_____
9. Are extra canisters current?	_____	_____
10. Is an approved first aid kit at the site?	_____	_____
11. Are wheel chocks for nurse tanks and rail cars available?	_____	_____
12. Is the fire extinguisher in good condition?	_____	_____
13. Has the local emergency crew been trained in handling ammonia emergencies?	_____	_____
14. Are there two self-contained air masks available for emergencies?	_____	_____
15. Are safety belts and life lines available?	_____	_____
16. Are the tanks approved for ammonia?	_____	_____
17. Is all piping done with Schedule 80, black pipe (no galvanized, copper, bronze or brass)?	_____	_____
18. Are all valves, etc., approved for ammonia?	_____	_____
19. Are all hoses labeled for ammonia?	_____	_____
20. Are hoses inspected regularly and changed when age or condition require?	_____	_____
21. Are excess flow checks in all openings where required?	_____	_____
22. Are all hoses and pipes equipped with relief valves where needed?	_____	_____
23. Are all relief valves capped?	_____	_____
24. Are relief valves replaced regularly?	_____	_____
25. Is the site clean and well kept?	_____	_____

AMMONIA PLANT SAFETY CHECK LIST (cont.)	SATIS-FACTORY	UNSATIS-FACTORY
26. Is there an automatic back check in the transport liquid line?	_____	_____
27. Is the co-op name, etc., on the plant?	_____	_____
28. Are the "Caution — Ammonia" or "Anhydrous Ammonia" decals in place?	_____	_____
29. Are the "Warning" & "First Aid" decals in place?	_____	_____
30. Are "Wear Your Goggles" decals located throughout the work area?	_____	_____
31. Is a "First Aid Water" decal on the safety tank or shower?	_____	_____
32. Are the liquid and vapor valves properly identified?	_____	_____
33. Is the transport stub marked "Caution — Ammonia" or "Anhydrous Ammonia?"	_____	_____
34. Is the manager's name and home phone number on the tank in 1-inch or larger letters?	_____	_____
35. Is the plant locked when unattended?	_____	_____
36. Is the paint on the tank in good condition?	_____	_____
37. Are all personnel assigned to ammonia physically capable to work in a hazardous area?	_____	_____
38. Are "Stop — Tank Car Connected" signs available and used?	_____	_____
39. Are protective guards in place and in good condition?	_____	_____
40. Is the facility free of leaks and in good condition?	_____	_____
41. Are tank supports in good condition? (No cracked or crumbled concrete, etc.)?	_____	_____
42. Are gauges — pressure and liquid level — operative?	_____	_____
43. Are hoses suitably racked and locked to prevent tampering?	_____	_____

_____ _____

Name of Co-op Location and Plant

_____ _____

Inspected by Date

All items reinspected and found satisfactory.

_____ _____

Reinspected by Date

It is your responsibility to be in compliance with your state regulations.

97-7023/590/1/12777

NURSE TANK ID # _____

AMMONIA NURSE TANK SAFETY CHECK LIST

	SATIS-FACTORY	UNSATIS-FACTORY
1. Is the safety water container on and full?	_____	_____
2. Is the safety chain and hitch pin in good condition?	_____	_____
3. What is the condition of the wagon tongue?	_____	_____
4. Are proper decals (in accordance with state requirements) on the nurse tank?	_____	_____
"Anhydrous Ammonia"	_____	_____
"Caution Ammonia" — Compound Curve	_____	_____
"Caution Ammonia" — Straight Line	_____	_____
"Wear Your Goggles"	_____	_____
"First Aid Water"	_____	_____
"Guaranteed Analysis"	_____	_____
"Slow Moving Vehicle"	_____	_____
"Vapor and Liquid Valve Markings"	_____	_____
"Warning and First Aid Decal Set"	_____	_____
"Maximum Pulling Speed"	_____	_____
"Ownership Identification"	_____	_____
"Tank Identification Numerals"	_____	_____
"1005" Placards	_____	_____
5. Are there glove and goggle pouches?	_____	_____
6. Are gloves and goggles in good condition?	_____	_____
7. Have wheel bearings been checked and greased?	_____	_____
8. Are tires in good condition, properly inflated and wheels in proper alignment?	_____	_____
9. Are tongue pins (tongue to axle) in good condition?	_____	_____
10. What is the condition of the paint?	_____	_____
11. What is the condition of the hose and hose end valve?	_____	_____
12. Are all hose end valves equipped with a self-locking device?	_____	_____
13. Has rayon hose been replaced within last two years?	_____	_____
Nylon Braid — 4 years	_____	_____
Stainless Steel Braid — 6 years	_____	_____

AMMONIA NURSE TANK SAFETY CHECK LIST (cont.)

	SATIS-FACTORY	UNSATIS-FACTORY
14. Is there a current dated pressure relief valve?	_____	_____
15. Is there a cap on the pressure relief valve?	_____	_____
16. Are there a pair of chock blocks available?	_____	_____
17. Are gauges in good working condition?	_____	_____
Pressure?	_____	_____
Float?	_____	_____
85 perecnt bleeder?	_____	_____
18. Are Acme caps on all vapor and liquid valves?	_____	_____
19. Are back check valves working?	_____	_____
20. Are valves marked "liquid" and "vapor?"	_____	_____
21. Is the nurse tank free of dents, cracks, bulges or other impairments?	_____	_____
22. Are the welds in good condition?	_____	_____
23. Is the weep hole on the relief valve open and free of paint or foreign material?	_____	_____
24. Are the nurse tank hoses protected by a hydrostatic relief valve?	_____	_____
25. Are the liquid and vapor valves in good working condition?	_____	_____
26. Is the frame in generally good condition and are the tank hold-down devices adequate?	_____	_____

_____ _____
Name of Co-op Location and Plant

_____ _____
Inspected by Date

All items reinspected and found satisfactory.

_____ _____
Reinspected by Date

It is your responsibility to be in compliance with your state regulations.

Applicator ID # _____

AMMONIA APPLICATOR SAFETY CHECK LIST

	SATIS-FACTORY	UNSATIS-FACTORY
1. Are all farmers instructed before they are allowed to use a co-op's applicator?	_____	_____
2. Is there a cartridge respirator for ammonia in the cab of every tractor while it is pulling any ammonia equipment?	_____	_____
3. Is the pressure bled out of the metering device before starting to clean the screen?	_____	_____
4. Is the pressure between the hose end valve and the applicator valve (or breakaway) bled off before disconnecting the hose end valve?	_____	_____
5. Is an angle hose end valve used on nurse tanks to fill pull-type applicators?	_____	_____
6. Have all connections and valves been checked for leaks?	_____	_____
PULL-TYPE APPLICATOR		
1. Is there a full safety water container attached?	_____	_____
2. Is the safety chain and hitch pin in good condition?	_____	_____
3. Are proper decals (in accordance with state requirements) on the nurse tank?	_____	_____
"Anhydrous Ammonia"	_____	_____
"Caution Ammonia" — Compound Curve	_____	_____
"Caution Ammonia" — Straight Line	_____	_____
"Wear Your Goggles"	_____	_____
"First Aid Water"	_____	_____
"Guaranteed Analysis"	_____	_____
"Slow Moving Vehicle"	_____	_____
"Vapor and Liquid Markings"	_____	_____
"Warning and First Aid Decal Set"	_____	_____
"Ownership Identification"	_____	_____
"Tank Identification Numerals"	_____	_____
"1005" Placards	_____	_____
4. Have wheel bearings been checked and greased?	_____	_____
5. Are tires and wheels in good condition and properly inflated?	_____	_____
6. What is the condition of the paint?	_____	_____
7. What is the condition of applicator tubes?	_____	_____
8. Is there a current dated pressure relief valve?	_____	_____
9. Is there a cap on the pressure relief valve?	_____	_____
10. Are gauges in good working condition?	_____	_____
Pressure?	_____	_____
Float?	_____	_____
85 percent bleeder?	_____	_____

AMMONIA APPLICATOR SAFETY CHECK LIST (cont.)

	SATIS-FACTORY	UNSATIS-FACTORY
11. Are Acme caps on all vapor and liquid valves?	_____	_____
12. Are back check valves working?	_____	_____
13. Is the applicator tank free of dents, cracks, or bulges or other impairments?	_____	_____
14. Are welds in good condition?	_____	_____
15. Is the weep hole on the relief valve open and free of paint or foreign material?	_____	_____
16. Are the liquid and vapor valves in good working order?	_____	_____
17. Is the frame in good condition and are the tank hold-down devices adequate?	_____	_____
18. Is there a gloves and goggle pouch?	_____	_____
19. Are gloves and goggles in good condition on applicator?	_____	_____
20. If applicator has fold-up wings, are pins in good condition that secure wings in upright position?	_____	_____

TOOL BAR-TYPE APPLICATOR

1. Is a quick disconnect (breakaway coupler) between the applicator and hose end valve?	_____	_____
2. Is the quick disconnect mounted solidly?	_____	_____
3. Does the quick disconnect make and break easily?	_____	_____
4. Does it leak?	_____	_____
5. Is the nurse tank safety chain connected to the applicator?	_____	_____
6. Is the hitch pin in good condition?	_____	_____
7. Does nurse tank hose end have globe line valve (straight through type)?	_____	_____
8. What is the condition of the applicator tubes?	_____	_____
9. If applicator has fold-up wings, are pins in good condition that secure wings in upright position?	_____	_____
10. What is the condition of pins and structural strength of 3-point hitch on tool bar?	_____	_____

_____ _____
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_____ _____
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97-7017/5-90/1/12777